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Chapter 1

**HOMEWORK #1**

1. What is the scientific model? What are its steps?

The scientific model is a systematic approach used in science study. The steps are as follows: Observation, hypothesis, experiment, theory

1. Jacque Charles described the direct relationship between temperature and volume of all gases at constant pressure. Should this be called Charles’s law or Charles’s theory?

Law. Charles describes the relationship, but does not attempt to explain why this happens.

1. A report in the media states that a specific diet will protect individuals from cancer. However, no data is reported to support this statement. Is this statement a hypothesis or a conclusion?

Without data (results) you cannot make a conclusion. This is just a hypothesis (guess).

1. What is the difference between a hypothesis, a theory, and a law? Hypothesis – Testable prediction

Theory – Explanation based on many observations

Law – Fact of nature (only states what occurs)

**HOMEWORK #2**

1. What is chemistry?

The science that investigates and explains the structure and properties of matter

1. Define matter.

Anything that has mass and takes up space.

1. List three properties of an orange.

Answer varies: orange in color, thick peel, sweet/sour taste, bumpy surface.

1. If you say that sulfur is yellow, you are stating a property of sulfur. What is meant by a property? Is color a physical or chemical property?

Physical. It describes the characteristics of matter that you can observe without having to change the characteristics of that matter.

1. How is a qualitative observation different from a quantitative observation? Give an example of each.

Qualitative – an observation that can be made without measurement. Ex. Green (color), rough (texture).

Quantitative – an observation made with measurement. Must have numbers. Example: 100 pounds (mass), 6 feet (height)

**HOMEWORK #3**

1. What is the solvent in an aqueous solution of salt? Why are aqueous solutions important?

Water is the solvent in any aqueous solution. Most of life processes (biological) occur in aqueous solution and most of the solutions that you encounter in your life (tea, cleaning solutions, etc.) are made with water.

1. Classify these as heterogeneous or homogeneous mixtures.
2. salt water If the salt is completely dissolved then its homogeneous mixture.
3. vegetable soup Heterogeneous
4. 14-k gold Homogeneous. A special name for this is an alloy (a solution of metals)

d. concrete Heterogeneous

1. What are the three states of matter? Solid, Liquid, and Gas
2. Describe the separation technique that could be used to separate each of the following mixtures.
3. Two colorless liquids Distillation. The liquid with the lower boiling point would be separated first.
4. A non-dissolving solid mixed with a liquid. Filtration. Separation is based on the size of the solid particles.
5. Red and blue marbles of the same size and mass. This is a trick question☹ You would separate the marbles based on their color.

**HOMEWORK #4**

1. Are the following examples of physical changes or chemical changes?
2. Water boils. Physical. The composition of water does not change.
3. A match burns. Chemical. The composition of the match does change. The products of the reaction look different the what you started with and you saw one or more indications of a chemical change (production of a gas and change in heat/energy)
4. Sugar dissolves in tea. Physical. This mixture could be separated physically by crystallization to remove the sugar. The composition of sugar will not change.
5. Sodium reacts with water. Chemical. Check out the following video if you want to see it <http://www.youtube.com/watch?v=ODf_sPexS2Q>
6. What is energy ? What part does it play in chemistry?

Energy is the capacity to do work. When chemical reactions take place energy is either absorbed or released.

1. Is the overall processing of food in your body an exothermic or endothermic process?

Exothermic. We break down food to release the energy stored in the food.

1. Name the elements contained in the following compounds
   1. Sodium chloride (NaCl) Sodium and chlorine
   2. Ammonia (NH4) Nitrogen and hydrogen
   3. Ethanol (C2H6O) Carbon, hydrogen and oxygen